AQUATIC INVERTEBRATES AND HABITAT AT A FIXED STATION ON THE POPLAR RIVER, DANIELS COUNTY, MONTANA

September 15, 2001

A report to
the Montana Department of Environmental Quality
Helena, Montana

by
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INTRODUCTION

This report is one of 38 brief interpretive summaries of data assembled as part of a statewide, multi-year study conducted by the Montana Department of Environmental Quality (MT DEQ). Each report discusses information generated from a single benthic invertebrate sample collection and habitat evaluation at a fixed station established on a gauged river or high-order tributary. The present treatise focuses on the aquatic community sampled on the Poplar River near Scobey, Montana on September 15, 2001. The sample site was located by GPS reading at 48° 43' 38" N, 105° 25' 42" W, lying within the Northwestern Glaciated Plains Ecoregion (Woods et al. 1998). The sample was collected by personnel of MT DEQ. Sampling effort consisted of either a composite of four Hess samples, or a one-minute kicknet collection (Bukantis 1998). Habitat parameters were evaluated using the MT DEQ Macroinvertebrate Habitat Assessment Field Form for streams with glide/pool prevalence. Invertebrate samples were processed and animals identified by Rhithron Associates, Inc. Analysis of invertebrate assemblages was accomplished by applying the method recommended by Bukantis (1998) for streams of Montana's Plains ecoregions. The method uses a multimetric battery to evaluate disturbance to biotic integrity. Results from the application of other metric batteries may be found in the Appendix.

RESULTS AND DISCUSSION

Table 1 itemizes the evaluated habitat parameters and shows the assigned scores for each, as well as the integrated score and condition category.

Overall habitat scored sub-optimally at this site on the Poplar River. Flow conditions were appraised as marginal. Field observations describe the site as "No riffles. Large, deep pools." Colonization potential of the substrate was perceived to be sub-optimal. Some sediment deposition was noted. Streambanks were moderately unstable, and disruption of vegetative protection was observed. The riparian zone was abbreviated on both sides of the channel.

Table 1. Stream and riparian habitat assessment for a fixed station on the Poplar River. September, 2001.

Max. possible score	**Parameter**	Poplar River near Scobey
20	Bottom substrate	15
20	Pool substrate char.	15
20	Pool variability	16
20	Channel alteration	14
20	Sediment deposition	14
20	Channel sinuosity	12
20	Channel flow status	10
20	Bank vegetation	5 / 8
20	Bank stability	5 / 8
20	Vegetated zone	5 / 7
200	Total	134
	Percent of maximum	**67**
	CONDITION*	**SUB-OPTIMAL**

*Condition categories: Optimal (OPT) > 80% of maximum score; Sub-optimal (SUB) ; 75 - 56%; Marginal (MARG) 49 - 29%; Poor <23%. Adapted from Plafkin et al. 1998.

Table 2. Metric values, scores, and bioassessment for a fixed station on the Poplar River. The Montana DEQ bioassessment metric battery recommended for streams of the Plains ecoregions (Bukantis 1998) was used for the evaluation. September 2001.

	Poplar River near Scobey	
METRICS	**METRIC VALUES**	**METRIC SCORES**
Taxa richness	41	3
EPT richness	7	2
Biotic index	8.00	0
% Dominant taxon	25.57	3
% Collectors	56.96	3
% EPT	23.62	1
Shannon diversity	3.90	3
% Scrapers and Shredders	5.83	1
Predator taxa	10	3
% Multivoltine	25.16	3
	TOTAL SCORE (max.=30)	22
	PERCENT OF MAX.	**73**
	Impairment classification	**SLIGHT**
	USE SUPPORT	**PARTIAL**

Bioassessment results are given in Table 2. When this bioassessment method is applied to these data, scores indicate that this site on the Poplar River is slightly impaired and only partially supports designated uses.

Near-lentic conditions were indicated by the taxonomic composition of the sampled assemblage. Twenty-three percent of animals collected were corixids; at least 7 species of them were present at the site. The dominant mayfly, *Callibaetis* sp., is typical of macrophyte-rich standing waters.

A diverse snail fauna and many amphipods were among the 32% of organisms in non-insect taxa. Nutrient enrichment, possibly exacerbated by the lack of the dilution effects of flow, may account for this abundance; the biotic index value (8.00) and dominance of tolerant organisms (56%) strengthens the hypothesis. The functional structure of the assemblage was skewed toward gatherers, reflecting the abundance of the scud *Hyalella azteca* and the tolerant mayfly *Callibaetis* sp.

Soft sediments were apparently available for burrowing taxa, since the mayfly Hexagenia limbata appeared in the sample. Anoxic sediments are suggested by the presence of 4 hemoglobin-bearing midge taxa, including *Cryptotendipes* sp., *Endochironomus* sp.

High taxa richness and a variety of predator taxa suggest that instream habitats were diverse. Soft sediments and macrophytes were probably present, and 4 "clinger" taxa imply that small areas of hard substrate surfaces were available.

CONCLUSIONS

- Near-lentic conditions and nutrient enrichment were indicated by the taxonomic composition and tolerance characteristics of the benthic assemblage.
- Instream habitats were apparently diverse and abundant, since the number of taxa was high and the predator fauna rich.
- The bioassessment method employed appears to overestimate the quality of biotic health in this case. The dominance of non-insect taxa and the high tolerance of the community suggest that the site is moderately impaired by lack of flow and by nutrient pollution.

LITERATURE CITED

Bukantis, R. 1998. Rapid bioassessment macroinvertebrate protocols: Sampling and sample analysis SOP's. Working draft, April 22, 1997. Montana Department of Environmental Quality. Planning Prevention and Assistance Division. Helena, Montana.

Woods, A.J., Omernik, J. M. Nesser, J.A., Shelden, J., and Azevedo, S. H. 1999. Ecoregions of Montana. (Color poster with map, descriptive text, summary tables, and photographs) Reston, Virginia. US Geological Survey.

APPENDIX

Taxonomic data and summaries

Poplar River

September 2001

Aquatic Invertebrate Taxonomic Data

Site Name: Poplar River near Scobey **Date: 9/15/01**

Site ID: M47POPR01 Approx. percent of sample used: 83

Taxon	Quantity	Percent	HBI	FFG
Hydra sp.	5	1.62	5	PR
Glossiphonia complanata	1	0.32	10	PR
Pisidium sp.	1	0.32	8	CF
Ferrissia sp.	2	0.65	6	SC
Fossaria sp.	1	0.32	6	SC
Physidae	1	0.32	8	SC
Gyraulus sp.	6	1.94	8	SC
Ostracoda	1	0.32	8	CG
Gammarus sp.	2	0.65	4	SH
Hyalella azteca	79	25.57	8	CG
Acari	1	0.32	5	PA
Total Misc. Taxa	**100**	**32.36**		
Enallagma sp.	18	5.83	9	PR
Ischnura sp.	1	0.32	9	PR
Total Odonata	**19**	**6.15**		
Callibaetis sp.	58	18.77	9	CG
Caenis sp.	8	2.59	7	CG
Hexagenia limbata	1	0.32	6	CG
Total Ephemeroptera	**67**	**21.68**		
Corixidae - immature	29	9.39	10	UN
Cenocorixa dakotensis	3	0.97	8	PR
Hesperocorixa laevigata	2	0.65	8	PH
Palmacorixa gilletti	2	0.65	5	PR
Sigara bicoloripennis	2	0.65	5	PH
Sigara grossolineata	4	1.29	5	PH
Trichocorixa borealis	24	7.77	10	PR
Sigara alternata	5	1.62	5	PH
Total Hemiptera	**71**	**22.98**		
Helicopsyche borealis	1	0.32	3	SC
Mystacides sp.	1	0.32	4	CG
Ptilostomis sp.	3	0.97	4	SH
Polycentropus sp.	1	0.32	6	PR
Total Trichoptera	**6**	**1.94**		
Neoclypeodytes sp.	1	0.32	5	PR
Dubiraphia sp.	4	1.29	6	CG
Haliplus sp.	2	0.65	5	PH
Total Coleoptera	**7**	**2.27**		
Cricotopus (Isocladius) Gr	9	2.91	7	CG
Cryptotendipes	3	0.97	6	UN
Dicrotendipes sp.	2	0.65	8	CG
Endochironomus sp.	2	0.65	10	SH
Micropsectra sp.	1	0.32	4	CG
Microtendipes sp.	8	2.59	6	CF
Orthocladius annectens	1	0.32	6	CG
Paratanytarsus sp.	5	1.62	6	UN
Thienemanniella sp.	2	0.65	6	CG
Thienemannimyia Gr.	6	1.94	5	PR
Total Chironomidae	**39**	**12.62**		
Grand Total	**309**	**100.00**		

Aquatic Invertebrate Summary

Site Name: Poplar River near Scobey **Date: 9/15/01**

Site ID: M47POPR01

SAMPLE TOTAL	309
EPT abundance	73
TAXA RICHNESS	41
Number EPT taxa	7
Percent EPT	23 62

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Hyalella azteca	79	25 57
Callibaetis sp	58	18 77
Corixidae - immature	29	9 39
Trichocorixa borealis	24	7 77
Enallagma sp	18	5 83
SUBTOTAL 5 DOMINANTS	208	67 31
Cricotopus (Isocladius) Gr	9	2 91
Caenis sp	8	2 59
Microtendipes sp	8	2 59
Gyraulus sp	6	1 94
Thienemannimyia Gr	6	1 94
TOTAL DOMINANTS	245	79 29

SAPROBITY

Hilsenhoff Biotic Index	8 00

DIVERSITY

Shannon H (loge)	2 71
Shannon H (log2)	3 90
Simpson D	0 13

VOLTINISM

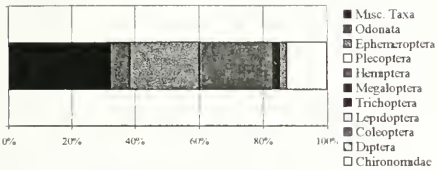
TYPE	ABUNDANCE	PERCENT
Multivoltine	78	25 16
Univoltine	224	72 41
Semivoltine	8	2 43

TAXA CHARACTERS

	#TAXA	ABUNDANCE	PERCENT
Tolerant	15	172	55 66
Intolerant	1	3	0 97
Clinger	4	15	4 85

TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Misc. Taxa	32 36	11	100
Odonata	6 15	2	19
Ephemeroptera	21 68	3	67
Plecoptera	0 00	0	0
Hemiptera	22 98	8	71
Megaloptera	0 00	0	0
Trichoptera	1 94	4	6
Lepidoptera	0 00	0	0
Coleoptera	2 27	3	7
Diptera	0 00	0	0
Chironomidae	12 62	10	39



BIOASSESSMENT INDICES

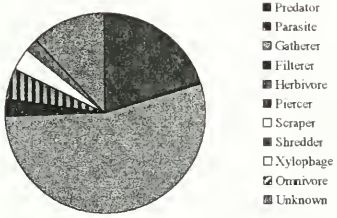
B-IBI (Karr et al)

METRIC	VALUE	SCORE
Taxa richness	41	5
E richness	3	1
P richness	0	1
T richness	4	1
Long-lived	3	3
Sensitive richness	1	1
%tolerant	55 66	1
%predators	20 06	5
Clinger richness	4	1
%dominance (3)	53 72	3
	TOTAL SCORE	22

44 %

FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Predator	20 06	10	62
Parasite	0 32	1	1
Gatherer	54 05	12	167
Filterer	2 91	2	9
Herbivore	0 00	0	0
Piercer	4 85	5	15
Scraper	3 56	5	11
Shredder	2 27	3	7
Xylophage	0 00	0	0
Omnivore	0 00	0	0
Unknown	11 97	3	37



MONTANA DEQ METRICS (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	41	3	3	3
EPT richness	7	2	0	0
Biotic Index	8 00	0	0	0
%Dominant taxon	25 57	3	3	2
%Collectors	56 96	3	3	3
%EPT	23 62	1	0	0
Shannon Diversity	3 90	3		
%Scrapers +Shredd	5 83	1	0	0
Predator taxa	10	3		
%Multivoltine	25 16	3		
%H of T	0		3	
TOTAL SCORES		22	12	8
PERCENT OF MAXIMUM		73 33	50 00	38 10
IMPAIRMENT CLASS		SLIGHT	MODERATE	MODERATE

COMMUNITY TOLERANCES

Sediment tolerant taxa	4
Percent sediment tolerant	3 24
Sediment sensitive taxa	0
Percent sediment sensitive	0 00
Metals tolerance index (McGuire)	2 81
Cold stenotherm taxa	0
Percent cold stenotherms	0 00

Montana DEQ metric batteries